

# SEQUENCE LISTING

<110> ROSENBLUM, MICHAEL G.  
CHEUNG, LAWRENCE

<120> MODIFIED PROTEINS, DESIGNER TOXINS, AND METHODS OF  
MAKING THEEOF

<130> CLFR:007US

<140> UNKNOWN

<141> 2002-02-12

<150> 60/268,402

<151> 2001-02-12

<160> 11

<170> PatentIn Ver. 2.1

<210> 1

<211> 316

<212> PRT

<213> Gelonium multiflorum

<400> 1

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Ser Leu Pro Thr Asn Asp Glu Glu Glu Thr Ser Lys Thr Leu Gly Leu
          35             40             45

Asp Thr Val Ser Phe Ser Thr Lys Gly Ala Thr Tyr Ile Thr Tyr Val
          50             55             60

Asn Phe Leu Asn Glu Leu Arg Val Lys Leu Lys Pro Glu Gly Asn Ser
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His Gly Ile Pro Leu Leu Arg Lys Lys Cys Asp Asp Pro Gly Lys Cys
          85             90             95

Phe Val Leu Val Ala Leu Ser Asn Asp Asn Gly Gln Leu Ala Glu Ile
          100            105            110

Ala Ile Asp Val Thr Ser Val Tyr Val Val Gly Tyr Gln Val Arg Asn
          115            120            125

Arg Ser Tyr Phe Phe Lys Asp Ala Pro Asp Ala Ala Tyr Glu Gly Leu
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Phe Lys Asn Thr Ile Lys Thr Arg Leu His Phe Gly Gly Ser Tyr Pro
          145            150            155            160

Ser Leu Glu Gly Glu Lys Ala Tyr Arg Glu Thr Thr Asp Leu Gly Ile
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|   |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|
|   | 165 |     | 170 |     | 175 |
| Glu Pro Leu Arg Ile Gly Ile Lys Lys Leu Asp Glu Asn Ala Ile Asp |     |     |     |     |     |
|   | 180 |     | 185 |     | 190 |
| Asn Tyr Lys Pro Thr Glu Ile Ala Ser Ser Leu Leu Val Val Ile Gln |     |     |     |     |     |
|   | 195 |     | 200 |     | 205 |
| Met Val Ser Glu Ala Ala Arg Phe Thr Phe Ile Glu Asn Gln Ile Arg |     |     |     |     |     |
|   | 210 |     | 215 |     | 220 |
| Asn Asn Phe Gln Gln Arg Ile Arg Pro Ala Asn Asn Thr Ile Ser Leu |     |     |     |     |     |
|   | 225 |     | 230 |     | 240 |
| Glu Asn Lys Trp Gly Lys Leu Ser Phe Gln Ile Arg Thr Ser Gly Ala |     |     |     |     |     |
|   |     | 245 |     | 250 | 255 |
| Asn Gly Met Phe Ser Glu Ala Val Glu Leu Glu Arg Ala Asn Gly Lys |     |     |     |     |     |
|   | 260 |     | 265 |     | 270 |
| Lys Tyr Tyr Val Thr Ala Val Asp Gln Val Lys Pro Lys Ile Ala Leu |     |     |     |     |     |
|   | 275 |     | 280 |     | 285 |
| Leu Lys Phe Val Asp Lys Asp Pro Lys Thr Ser Leu Ala Ala Glu Leu |     |     |     |     |     |
|   | 290 |     | 295 |     | 300 |
| Ile Ile Gln Asn Tyr Glu Ser Leu Val Gly Phe Asp                 |     |     |     |     |     |
|   | 305 |     | 310 |     | 315 |

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| ctgtggcgac | atggttttgc  | tgcactacta | ttgtacttgg | atcaacggcg | aggattttct  | 120  |
| ctcttccac  | aaatgatgaa  | gaagaaacca | gtaagacgct | tggcctggac | accgtgagct  | 180  |
| ttagcactaa | aggtgccact  | tatattacct | acgtgaattt | cttgaatgag | ctacgagtta  | 240  |
| aattgaaacc | cgaaggtaac  | agccatggaa | tcccattgct | gcgcaaaaaa | tgtgatgatc  | 300  |
| ctggaaagtg | tttcgttttg  | gtagcgcttt | caaatagaca | tggacagttg | gcggaatatg  | 360  |
| ctatagatgt | tacaagtgtt  | tatgtggtgg | gctatcaagt | aagaaacaga | tcttactttct | 420  |
| ttaaagatgc | tccagatgct  | gcttacgaag | gcctcttcaa | aaacacaatt | aaaacaagac  | 480  |
| ttcatttttg | cggcagctat  | ccctcgctgg | aaggtgagaa | ggcatataga | gagacaacag  | 540  |
| acttgggcat | tgaaccatta  | aggattggca | tcaagaaact | tgatgaaaat | gcgatagaca  | 600  |
| attataaacc | aacggagata  | gctagtcttc | tattggttgt | tattcaaagt | gtgtctgaag  | 660  |
| cagctcgatt | cacctttatt  | gagaacaaaa | ttagaaataa | ctttcaacag | agaattcgcc  | 720  |
| cggcgaataa | tacaatcagc  | cttgagaata | aatggggtaa | actctcgctc | cagatccgga  | 780  |
| catcaggtgc | aaatggaatg  | ttttcggagg | cagttgaatt | ggaacgtgca | aatggcaaaa  | 840  |
| aatactatgt | caccgcagtt  | gatcaagtaa | aacccaaaaa | agcactcttg | aagttcgtcg  | 900  |
| ataaagatcc | taaaacgagc  | cttgcctgct | aattgataat | ccagaactat | gagtcattag  | 960  |
| tgggctttga | ttagtacaac  | ttattgtgct | ttttatatat | tatagatatg | atgccggggc  | 1020 |
| atgtattggc | cttcgtagct  | taaataaagg | catcgaatat | tagcctcggg | ggtgtatcta  | 1080 |
| tcatgctgtg | ttgtaaaact  | gccaatgttt | atgttatcaa | acagaaattg | gcatgaagtt  | 1140 |
| tctgtacaag | tgttcaataa  | actgggctat | acatgc     |            |             | 1176 |

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 gccaccgcca ccactagttg aggagactgt 30

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<220>  
 <223> Description of Artificial Sequence: Synthetic  
 Primer

<400> 7  
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<210> 8  
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<220>  
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# Primer

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<223> Description of Artificial Sequence: Synthetic  
Primer

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<220>  
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1 5 10 15  
gta gga gac agg gtc agc gtc acc tgc aag gcc agt cag aat gtg gat 96  
Val Gly Asp Arg Val Ser Val Thr Cys Lys Ala Ser Gln Asn Val Asp  
20 25 30  
act aat gta gcc tgg tat caa caa aaa cca ggg caa tct cct gaa cca 144  
Thr Asn Val Ala Trp Tyr Gln Gln Lys Pro Gly Gln Ser Pro Glu Pro  
35 40 45  
ctg ctt ttc tcg gca tcc tac cgt tac act gga gtc cct gat cgc ttc 192  
Leu Leu Phe Ser Ala Ser Tyr Arg Tyr Thr Gly Val Pro Asp Arg Phe  
50 55 60  
aca ggc agt gga tct ggg aca gat ttc act ctc acc atc agc aat gtg 240  
Thr Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Asn Val  
65 70 75 80  
cag tct gaa gac ttg gca gag tat ttc tgt cag caa tat aac agc tat 288  
Gln Ser Glu Asp Leu Ala Glu Tyr Phe Cys Gln Gln Tyr Asn Ser Tyr  
85 90 95  
cct ctg acg ttc ggt gga ggc acc aag ctg gag atc aaa ggc tcc acc 336

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|--|
| Pro | Leu | Thr | Phe | Gly | Gly | Gly | Thr | Lys | Leu | Glu | Ile | Lys | Gly | Ser | Thr |      |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |      |  |
| agc | ggc | agc | ggt | aag | cca | ggc | tcc | ggc | gaa | ggc | agc | acc | aaa | ggc | gaa | 384  |  |
| Ser | Gly | Ser | Gly | Lys | Pro | Gly | Ser | Gly | Glu | Gly | Ser | Thr | Lys | Gly | Glu |      |  |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |      |  |
| gtg | aag | gtt | gag | gag | tct | gga | gga | ggc | ttg | gtg | caa | cct | gga | gga | tcc | 432  |  |
| Val | Lys | Val | Glu | Glu | Ser | Gly | Gly | Gly | Leu | Val | Gln | Pro | Gly | Gly | Ser |      |  |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |      |  |
| atg | aaa | ctc | tcc | tgt | gtt | gtc | tct | gga | ttc | act | ttc | ggt | aat | tac | tgg | 480  |  |
| Met | Lys | Leu | Ser | Cys | Val | Val | Ser | Gly | Phe | Thr | Phe | Gly | Asn | Tyr | Trp |      |  |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |      |  |
| atg | aac | tgg | gtc | cgc | cag | tct | cca | gag | aag | ggg | ctt | gag | tgg | att | gca | 528  |  |
| Met | Asn | Trp | Val | Arg | Gln | Ser | Pro | Glu | Lys | Gly | Leu | Glu | Trp | Ile | Ala |      |  |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |      |  |
| gaa | att | aga | ttg | aaa | tcc | aat | aat | ttt | gca | aga | tat | tat | gcg | gag | tct | 576  |  |
| Glu | Ile | Arg | Leu | Lys | Ser | Asn | Asn | Phe | Ala | Arg | Tyr | Tyr | Ala | Glu | Ser |      |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |      |  |
| gtg | aaa | ggg | agg | ttc | acc | atc | tca | aga | gat | gat | tcc | aaa | agt | agt | gtc | 624  |  |
| Val | Lys | Gly | Arg | Phe | Thr | Ile | Ser | Arg | Asp | Asp | Ser | Lys | Ser | Ser | Val |      |  |
|     | 195 |     |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |      |  |
| tac | ctg | caa | atg | atc | aac | cta | aga | gct | gaa | gat | act | ggc | att | tat | tac | 672  |  |
| Tyr | Leu | Gln | Met | Ile | Asn | Leu | Arg | Ala | Glu | Asp | Thr | Gly | Ile | Tyr | Tyr |      |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |      |  |
| tgt | acc | agt | tat | ggt | aac | tac | gtt | ggg | cac | tat | ttt | gac | cac | tgg | ggc | 720  |  |
| Cys | Thr | Ser | Tyr | Gly | Asn | Tyr | Val | Gly | His | Tyr | Phe | Asp | His | Trp | Gly |      |  |
| 225 |     |     |     |     | 230 |     |     |     | 235 |     |     |     |     | 240 |     |      |  |
| caa | ggc | acc | act | ctc | acc | gtc | tcc | tca | gct | agc | ggt | ggc | ggt | ggc | tcc | 768  |  |
| Gln | Gly | Thr | Thr | Leu | Thr | Val | Ser | Ser | Ala | Ser | Gly | Gly | Gly | Gly | Ser |      |  |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |      |  |
| ggt | cta | gac | acc | gtg | agc | ttt | agc | act | aaa | ggt | gcc | act | tat | att | acc | 816  |  |
| Gly | Leu | Asp | Thr | Val | Ser | Phe | Ser | Thr | Lys | Gly | Ala | Thr | Tyr | Ile | Thr |      |  |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |      |  |
| tac | gtg | aat | ttc | ttg | aat | gag | cta | cga | gtt | aaa | ttg | aaa | ccc | gaa | ggt | 864  |  |
| Tyr | Val | Asn | Phe | Leu | Asn | Glu | Leu | Arg | Val | Lys | Leu | Lys | Pro | Glu | Gly |      |  |
|     |     | 275 |     |     |     | 280 |     |     |     |     |     | 285 |     |     |     |      |  |
| aac | agc | cat | gga | atc | cca | ttg | ctg | cgc | aaa | aaa | tgt | gat | gat | cct | gga | 912  |  |
| Asn | Ser | His | Gly | Ile | Pro | Leu | Leu | Arg | Lys | Lys | Cys | Asp | Asp | Pro | Gly |      |  |
|     |     | 290 |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |      |  |
| aag | tgt | ttc | gtt | ttg | gta | gcg | ctt | tca | aat | gac | aat | gga | cag | ttg | gcg | 960  |  |
| Lys | Cys | Phe | Val | Leu | Val | Ala | Leu | Ser | Asn | Asp | Asn | Gly | Gln | Leu | Ala |      |  |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     | 320 |     |      |  |
| gaa | ata | gct | ata | gat | gtt | aca | agt | gtt | tat | gtg | gtg | ggc | tat | caa | gta | 1008 |  |
| Glu | Ile | Ala | Ile | Asp | Val | Thr | Ser | Val | Tyr | Val | Val | Gly | Tyr | Gln | Val |      |  |

| 325   | 330 | 335 |      |
|---|-----|-----|------|
| aga aac aga tct tac ttc ttt aaa gat gct cca gat gct gct tac gaa |     |     | 1056 |
| Arg Asn Arg Ser Tyr Phe Phe Lys Asp Ala Pro Asp Ala Ala Tyr Glu |     |     |      |
| 340   | 345 | 350 |      |
| ggc ctc ttc aaa aac aca att aaa aca aga ctt cat ttt ggc ggc agc |     |     | 1104 |
| Gly Leu Phe Lys Asn Thr Ile Lys Thr Arg Leu His Phe Gly Gly Ser |     |     |      |
| 355   | 360 | 365 |      |
| tat ccc tcg ctg gaa ggt gag aag gca tat aga gag aca aca gac ttg |     |     | 1152 |
| Tyr Pro Ser Leu Glu Gly Glu Lys Ala Tyr Arg Glu Thr Thr Asp Leu |     |     |      |
| 370   | 375 | 380 |      |
| ggc att gaa cca tta agg att ggc atc aag aaa ctt gat gaa aat gcg |     |     | 1200 |
| Gly Ile Glu Pro Leu Arg Ile Gly Ile Lys Lys Leu Asp Glu Asn Ala |     |     |      |
| 385   | 390 | 395 | 400  |
| ata gac aat tat aaa cca acg gag ata gct agt tct cta ttg gtt gtt |     |     | 1248 |
| Ile Asp Asn Tyr Lys Pro Thr Glu Ile Ala Ser Ser Leu Leu Val Val |     |     |      |
| 405   | 410 | 415 |      |
| att caa atg gtg tct gaa gca gct cga ttc acc ttt att gag aac caa |     |     | 1296 |
| Ile Gln Met Val Ser Glu Ala Ala Arg Phe Thr Phe Ile Glu Asn Gln |     |     |      |
| 420   | 425 | 430 |      |
| att aga aat aac ttt caa cag aga att cgc ccg gcg aat aat aca atc |     |     | 1344 |
| Ile Arg Asn Asn Phe Gln Gln Arg Ile Arg Pro Ala Asn Asn Thr Ile |     |     |      |
| 435   | 440 | 445 |      |
| agc ctt gag aat aaa tgg ggt aaa ctc tcg ttc cag atc cgg aca tca |     |     | 1392 |
| Ser Leu Glu Asn Lys Trp Gly Lys Leu Ser Phe Gln Ile Arg Thr Ser |     |     |      |
| 450   | 455 | 460 |      |
| ggc gca aat gga atg ttt tcg gag gca gtt gaa ttg gaa cgt gca aat |     |     | 1440 |
| Gly Ala Asn Gly Met Phe Ser Glu Ala Val Glu Leu Glu Arg Ala Asn |     |     |      |
| 465   | 470 | 475 | 480  |
| ggc aaa aaa tac tat gtc acc gca gtt gat caa gta aaa ccc aaa ata |     |     | 1488 |
| Gly Lys Lys Tyr Tyr Val Thr Ala Val Asp Gln Val Lys Pro Lys Ile |     |     |      |
| 485   | 490 | 495 |      |
| gca ctc ttg aag ttc gtc gat aaa gat cct aaa taatga              |     |     | 1527 |
| Ala Leu Leu Lys Phe Val Asp Lys Asp Pro Lys                     |     |     |      |
| 500   | 505 |     |      |

<210> 11

<211> 507

<212> PRT

<213> Artificial Sequence

<223> Description of Artificial Sequence: Synthetic

<400> 11

Met Thr Asp Ile Val Met Thr Gln Ser Gln Lys Phe Met Ser Thr Ser

1

5

10

15

Val Gly Asp Arg Val Ser Val Thr Cys Lys Ala Ser Gln Asn Val Asp  
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Thr Asn Val Ala Trp Tyr Gln Gln Lys Pro Gly Gln Ser Pro Glu Pro  
35 40 45  
Leu Leu Phe Ser Ala Ser Tyr Arg Tyr Thr Gly Val Pro Asp Arg Phe  
50 55 60  
Thr Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Asn Val  
65 70 75 80  
Gln Ser Glu Asp Leu Ala Glu Tyr Phe Cys Gln Gln Tyr Asn Ser Tyr  
85 90 95  
Pro Leu Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Gly Ser Thr  
100 105 110  
Ser Gly Ser Gly Lys Pro Gly Ser Gly Glu Gly Ser Thr Lys Gly Glu  
115 120 125  
Val Lys Val Glu Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly Ser  
130 135 140  
Met Lys Leu Ser Cys Val Val Ser Gly Phe Thr Phe Gly Asn Tyr Trp  
145 150 155 160  
Met Asn Trp Val Arg Gln Ser Pro Glu Lys Gly Leu Glu Trp Ile Ala  
165 170 175  
Glu Ile Arg Leu Lys Ser Asn Asn Phe Ala Arg Tyr Tyr Ala Glu Ser  
180 185 190  
Val Lys Gly Arg Phe Thr Ile Ser Arg Asp Asp Ser Lys Ser Ser Val  
195 200 205  
Tyr Leu Gln Met Ile Asn Leu Arg Ala Glu Asp Thr Gly Ile Tyr Tyr  
210 215 220  
Cys Thr Ser Tyr Gly Asn Tyr Val Gly His Tyr Phe Asp His Trp Gly  
225 230 235 240  
Gln Gly Thr Thr Leu Thr Val Ser Ser Ala Ser Gly Gly Gly Gly Ser  
245 250 255  
Gly Leu Asp Thr Val Ser Phe Ser Thr Lys Gly Ala Thr Tyr Ile Thr  
260 265 270  
Tyr Val Asn Phe Leu Asn Glu Leu Arg Val Lys Leu Lys Pro Glu Gly  
275 280 285  
Asn Ser His Gly Ile Pro Leu Leu Arg Lys Lys Cys Asp Asp Pro Gly  
290 295 300  
Lys Cys Phe Val Leu Val Ala Leu Ser Asn Asp Asn Gly Gln Leu Ala  
305 310 315 320

Glu Ile Ala Ile Asp Val Thr Ser Val Tyr Val Val Gly Tyr Gln Val  
 325 330 335  
 Arg Asn Arg Ser Tyr Phe Phe Lys Asp Ala Pro Asp Ala Ala Tyr Glu  
 340 345 350  
 Gly Leu Phe Lys Asn Thr Ile Lys Thr Arg Leu His Phe Gly Gly Ser  
 355 360 365  
 Tyr Pro Ser Leu Glu Gly Glu Lys Ala Tyr Arg Glu Thr Thr Asp Leu  
 370 375 380  
 Gly Ile Glu Pro Leu Arg Ile Gly Ile Lys Lys Leu Asp Glu Asn Ala  
 385 390 395 400  
 Ile Asp Asn Tyr Lys Pro Thr Glu Ile Ala Ser Ser Leu Leu Val Val  
 405 410 415  
 Ile Gln Met Val Ser Glu Ala Ala Arg Phe Thr Phe Ile Glu Asn Gln  
 420 425 430  
 Ile Arg Asn Asn Phe Gln Gln Arg Ile Arg Pro Ala Asn Asn Thr Ile  
 435 440 445  
 Ser Leu Glu Asn Lys Trp Gly Lys Leu Ser Phe Gln Ile Arg Thr Ser  
 450 455 460  
 Gly Ala Asn Gly Met Phe Ser Glu Ala Val Glu Leu Glu Arg Ala Asn  
 465 470 475 480  
 Gly Lys Lys Tyr Tyr Val Thr Ala Val Asp Gln Val Lys Pro Lys Ile  
 485 490 495  
 Ala Leu Leu Lys Phe Val Asp Lys Asp Pro Lys  
 500 505